CLAIMS

What is claimed is:

1. A method for fabricating a photocatalytic fluorescent lamp device capable of cleaning air, comprising:

(1) formulating a photocatalyst anatase TiO2 sol mixture and dip coating a glass fiber cloth or glass fiber sleeve with said photocatalyst anatase TiO2 sol mixture;

(2) drying said photocatalyst sol coated glass fiber cloth or glass fiber sleeve into a photocatalyst-coated glass fiber cloth or glass fiber sleeve;

(3) impregnating said photocatalyst-coated glass fiber cloth or glass fiber sleeve with a solution of an oxidation catalyst comprising precious metals or transition metal-oxides;

(4) drying again said impregnated photocatalyst-coated glass fiber cloth or glass fiber sleeve;

(5) tailoring the photocatalyst sol coated glass fiber cloth or glass fiber sleeve obtained from step (2) or said impregnated photocatalyst-coated glass fiber cloth or glass fiber sleeve from step (4) to a fluorescent lamp tube and encompassing at least a portion of said fluorescent lamp tube with said photocatalyst-coated glass fiber cloth or glass fiber sleeve; and

(6) using UV resistant glue, thermal plastic ring belt, sewing, or laser sintering

techniques to fix said photocatalyst-coated glass fiber cloth or glass fiber sleeve on said fluorescent lamp tube.

2. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein said photocatalyst anatase TiO_2 sol mixture comprises nano crystalline of Anatase TiO_2particles with nano particles of WO_3, ZnO, SnO_2, or Fe_2O_3, and at least comprises anatase TiO_2 nano crystalline particles therein made of titanium alkoxide $Ti(OR)_4$ as a raw component that is dissolved in aqueous solution containing alcohol for preparing nano crystalline particle anatase TiO_2 sol.

3. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 2, wherein said nano crystalline particle anatase TiO_2 sol is prepared by acidic method including the steps of:

using acidic process to prepare anatase TiO_2 sol; and

adding H_4TiO_4 sol to a H_4TiO_4/ anatase TiO_2 ratio of about 0-10wt%, thereby improving thickness, adhesion, and hardness of nano crystalline anatase TiO_2 sol coating.

4. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 2, wherein said nano crystalline particle anatase TiO_2 sol is prepared by alkaline method including the steps of:

using alkaline process to prepare anatase TiO_2 sol; and

adding H_4TiO_4 sol to a H_4TiO_4/ anatase TiO_2 ratio of about 0-10wt%, thereby improving thickness, adhesion, and hardness of nano crystalline anatase TiO_2 sol coating.

5. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein said glass fiber cloth and glass fiber sleeve is made of a plurality of single fiber woven or melted into porous, transparent, and in roll form.

6. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein when applying said anatase TiO2 sol mixture on glass fiber cloth and glass fiber sleeve to carry out photocatalytic sol gel coating, photocatalyst thereof integrates with said glass fiber cloth and glass sleeve with chemical bonding, such that photocatalyst thereof will not peel off from said glass fiber cloth and glass fiber sleeve.

7. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein said oxidation catalyst comprising precious metals or transition metals-oxides is added when preparing said anatase TiO2 sol mixture, or dipping in solution, or spraying on said glass fiber cloth and glass fiber sleeve, and step (4) further comprises the step of carrying out a

baking process so that said oxidation catalyst is absorbed or permeated into said photocatalyst, whereby through the above said steps promoting efficiency of said photocatalytic coating glass fiber cloth and sleeve covering said fluorescent lamp.

8. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein said photocatalyst anatase TiO2 sol mixture is blended with oxidation catalyst comprises Pd, Pt, Au, or Ag precious metal salt solution, or Pd, Pt, Au, or Ag precious metal nano-particle sol in a manner such that said precious metal quantity is less than about 1.0 wt% of anatase TiO_2.

9. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein said photocatalyst anatase TiO2 sol mixture blended with oxidation catalyst comprises W, Zn, Fe, Mo, Nb, V, Ce, or Cr transition metal salt solution, or W, Zn, Fe, Mo, Nb, V, Ce, or Cr transition metal-oxides nanoparticle sol in a manner that said transition metal quantity is less than about 100 wt% of anatase TiO_2.

10. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein said photocatalyst-coated glass fiber cloth or glass fiber sleeve on said fluorescent lamp tube is shaped according to

the shape of said fluorescent lamp tube, and said photocatalyst-coated glass fiber cloth or glass fiber sleeve is tailored and cut into size matching the size of said fluorescent lamp tube, or said fluorescent lamp tube is tightly wrapped with said photocatalyst-coated glass fiber cloth, or said fluorescent lamp tube is covered by glass fiber sleeve.

11. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein said fluorescent lamp emits 420-700nm visible light and a small amount of 365nm and 405nm near UV as light source for lighting and air cleaning.

12. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 1, wherein said photocatalytic fluorescent lamp made by anatase TiO2 nano crystalline particle sol and it mixture sol coated on glass fiber cloth or sleeve wrapping or covering said fluorescent lamp can be excited by UV or visible light emitted from said fluorescent lamp to produce photocatalytic interaction, thereby achieving good illumination, and effectively cleaning air such as waste gas degradation, odor eliminating, anti-bacteria, and self-cleaning.

13. A process for treating waste gases, using the photocatalytic fluorescent lamp capable of cleaning air according to method of claim 1, said process comprising

the steps of:

(1) employing an open natural convection type, whereby heat energy radiated from a fluorescent lamp heats air adjacent thereto and causes a natural convection of waste gases;

(2) said waste gases that diffuse through interstitial spaces within impregnated photocatalyst-coated glass fiber cloth or sleeve into a gap between said fluorescent lamp tube and said impregnated photocatalyst-coated glass fiber cloth or sleeve, where, said waste gases undergo photocatalytical degradation and oxidation; and

(3) said waste gases undergo photocatalytical degradation and oxidation and then diffuse back by natural convection through said interstitial spaces within said impregnated photocatalyst-coated glass fiber cloth away from said fluorescent lamp tube.

14. The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 13, wherein said fluorescent lamp for treating waste gases according to the invention is hung perpendicularly or horizontally, natural convection of air, forces air beneath said fluorescent lamp to flow upwardly and a part thereof to diffuse into the gap between said photocatalyst-coated glass fiber cloth and sleeve and said fluorescent lamp tube, wherein when hung perpendicularly, an outer sleeve is provided around said fluorescent lamp and results in a better effect, said outer sleeve is made of transparent material and has an inner diameter twice larger that of an outer

diameter of said fluorescent lamp and a length comparable to that of said fluorescent lamp.

15. A process for treating waste gases, using the photocatalytic fluorescent lamp capable of cleaning air according to method of claim 1, said process comprising the steps of:

(1) employing an open forced convection configuration, said photocatalytic fluorescent lamp capable of cleaning air being incorporated with a fan or a blower in forced convection wind channels, whereby heat energy radiated from a fluorescent lamp heats air adjacent thereto and said fan or blower causes a forced convection of waste gases;

(2) said waste gases diffuse through interstitial spaces within impregnated photocatalyst-coated glass fiber cloth into a gap between said fluorescent lamp tube and said impregnated photocatalyst-coated glass fiber cloth or sleeve, where said waste gases undergo photocatalytical degradation and oxidation; and

(3) said waste gases undergo photocatalytical degradation and oxidation and then diffuse back by natural convection through said interstitial spaces within said impregnated photocatalyst-coated glass fiber cloth or sleeve away from said fluorescent lamp tube.

16. The method for fabricating a photocatalytic fluorescent lamp capable of

cleaning air as claimed in claim 15, wherein said fluorescent lamp for treating waste gases according to the invention is installed in an outer sleeve connected to said fan or blower, and said outer sleeve is made of transparent material and has an inner diameter twice larger than that of an outer diameter of said fluorescent lamp and a length comparable to that of said fluorescent lamp.